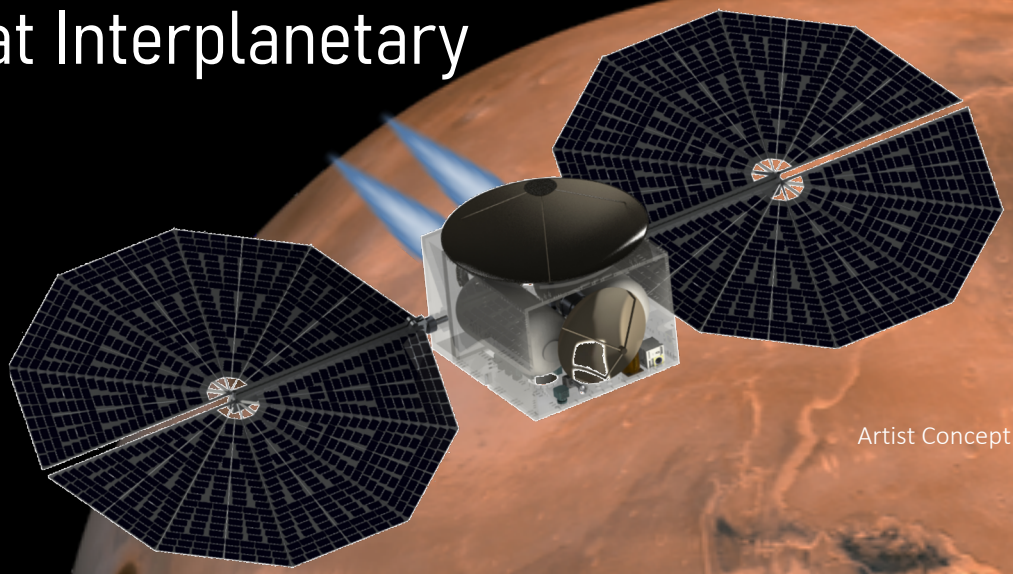
Jet Propulsion Laboratory
California Institute of Technology

UEBER

Universal Electric Bus for Exploration and Reconnaissance Concept

Enabling Small Sat Interplanetary Missions



Artist Concept

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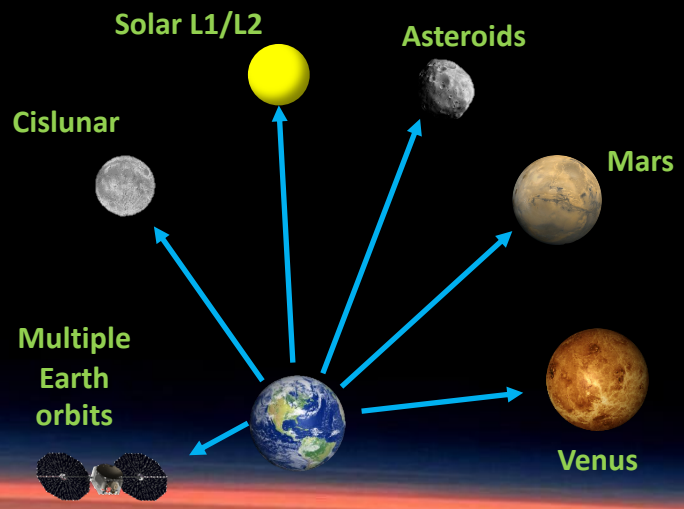
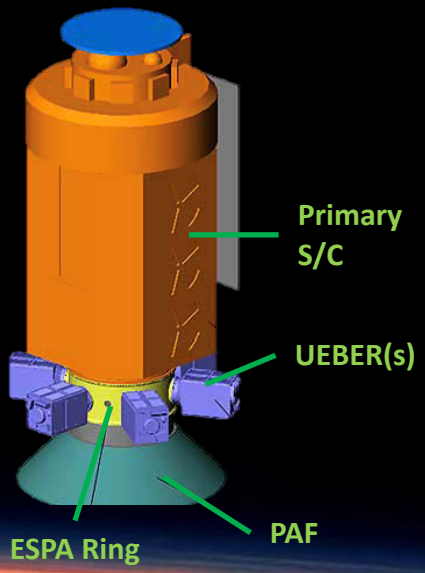
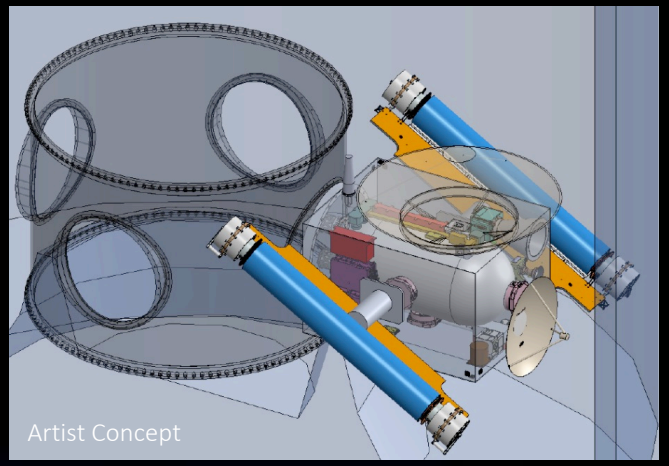
What is UEBER?

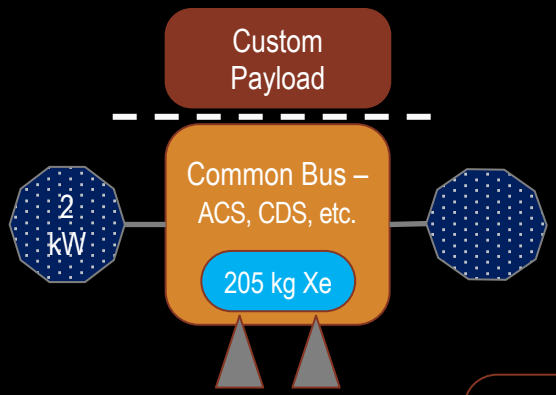
- ESPA-class satellite bus with large SEP system (~2 kW)
- Common bus with customizable payload (10 – 100+ kg)
- Provides > 10 km/s of ΔV to explore many destinations via rideshare
- Enables ubiquitous, low-cost planetary missions – low $100M's

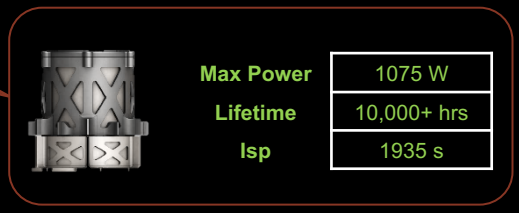


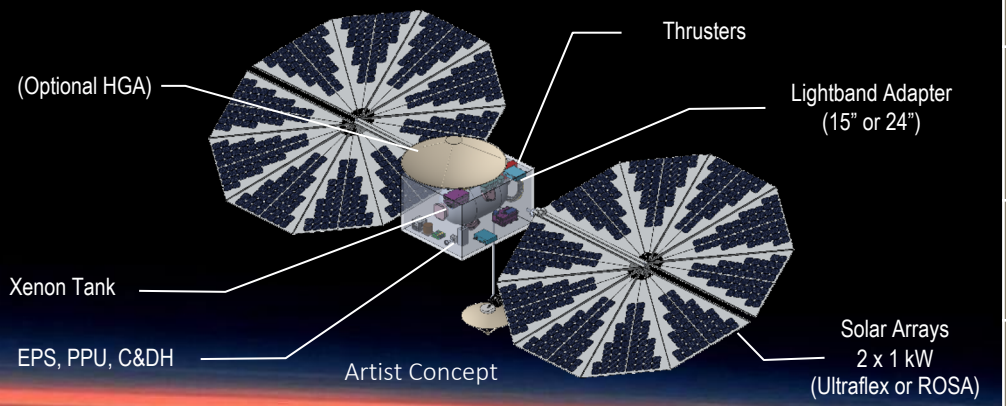




UEBER Concept Components and Mass



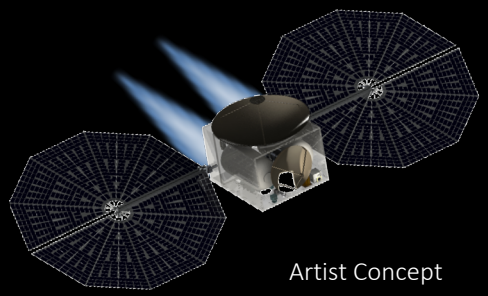




System	Basic Capabilities	Mass Estimate
Payload	• Multiple mounting surfaces for instruments, etc. • Volume/interfaces TBD	Varies
Telecom	• Single String Dual Band UST • Additional Telecom added as optional payload	5 kg
Propulsion	• 2x MaSMi Hall Thrusters • Up to 205 kg Xenon	32 kg
ACS	• 0.2 deg • Sun sensors, star tracker, IMU, RWAs	9 kg
Power	• 2 kW (BOL) lightweight SA • Secondary batteries – 200Wh • 1-DOF SA Gimbal	35 kg
C&DH	• Dual-Core LEON3FT (SPHINX), 100MHz, 8GB NAND Interfaces: RS422, SPI, I2C, Spacewire, GPIO, UART	4 kg
Structures/ Harness/ Thermal	• ~1m x ~1m x ~1m • Compatible with ESPA or ESPA Grande	68 kg
Payload	• Multiple mounting surfaces for instruments, antennae, telecom • Volume/interfaces TBD	

Destinations

Assumptions:
- Rideshare to GTO
- Configuration:
  - 2x MaSMi Engines
  - Up to **205 kg** Xenon
  - **450 kg** Max Wet Mass
  - **150 kg** Bus Mass



Artist Concept

* Payload includes anything beyond the standard bus components, such as instruments, telecom and arrays, gimbals, special equipment and mounting mechanisms, etc.

Payload* Mass	ΔV	
		NEO Tour
35 kg	12 km/s	Low Mars Orbit
70 kg		Phobos
	10 km/s	High Mars Orbit (Areostationary/Deimos)
110 kg		
	8 km/s	Venus Aerobraking
150 kg		
	6 km/s	Mars Surface via Direct Entry
180 kg		Venus Flyby/Entry/Aerocapture
	4 km/s	
>200 kg		Earth/Sun Lagrange point
	2 km/s	Lunar Flyby or DRO